Alternative Methods of Assessing Corn Silage Value Based on Yield and Quality



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Introduction

- In corn (Zea mays L.) silage hybrid or management trials it is often difficult to accurately assess the economic value of treatments accurately. The economic value of treatments is a function of the yield, forage quality and the cost of dairy ration adjustment to maximize milk yield. A method is needed that is flexible to adjust for the value of nutrients in the silage on individual farms.
- A spreadsheet based program was developed to facilitate the evaluation and ranking of treatments based on the nutrient value, potential milk response, yield and cost of production of various treatments. The need to adjust for nutrient values is especially critical now since nutrients values have changed from historic levels.
- Weiss (2001) proposed a method that estimated the nutrient value of crude protein (CP), neutral detergent fiber (NDF) and energy (NEL), combined with the potential for increased milk production based on neutral detergent fiber digestibility (NDFD) and the cost of production for each treatment. Treatments were then ranked relative to the lowest ranking treatment from an economic perspective.
- Other methods of assessing corn hybrid

The objectives of this study were to:

- 1) Develop a spreadsheet based relative economic value approach) REVA to assess corn yield and forage quality effects on economic returns.
- 2) Compare hybrid rankings to Milk 2006.

Materials and Methods:

REVA Assumptions:

The value of NEL, CP, and NDF were developed using multiple regression techniques assuming corn @\$140/ton, SBM@\$250/ton and alfalfa hay @\$150/ton. These resulted in values of \$0.07/Mcal, \$0.13/lb CP, and \$0.048/lb NDF.

IN the REVA model,

- Total economic value of nutrients= NEL value(\$/ton) + NDF value (\$/ton) + CP value (\$/ton)
- Incr. in Milk Revenue (\$/cow/day)= Rel. diff. in NDFD (%) * Milk inc. (0.55 lb of milk /1.0 % unit change in NDFD per cow per day) * Milk price (\$0. 2/lb)
- Increase in feed costs (\$/cow/day)= Rel. difference in NDFD (%) * DMI increase (0.375lb DM per unit change in NDFD per cow per day) * Feed cost (\$0.07/lb)

Increase in net income (\$/cow/day)= Increase in milk revenue (\$ /cow/day) -Increase in feed costs (\$ /cow/day)

- Increase in Net Income (\$/ton)=Increase in net income (\$/cow/day) / Corn silage intake (22 lb DM cow/day) * 2000 (lb/ton)
- Production Costs (\$/ton)= Establishment Cost(\$/ton) +Harvesting Costs(\$/ton)
- Corn silage value (\$/ton)=Total economic value of nutrients (\$/ton) + Increase in Net Income (\$/ton)-Production Costs (\$/ton)
- Corn silage value (\$/ac)=Corn silage value (\$ /ton) * DM yield (ton/ac)

Results

Table 1. Economic assessment of a hybrid performance trial in Crawford County PA, in 2007. Assumptions: Milk= \$20/cwt, NEL=\$0.07/Mcal, CP=\$0.13/lb, NDF=\$0.048/lb.

Performance measures						REVA Results		Milk 2006 Analysis				
DM Yield	NDF	NDFD	Starch	CP	NEI	Relative difference		Milk/ton	Milk/Acre	Relative difference		
T/A	%	%	%	%	Mcal/lb	Rank	\$/acre	lbs/ton	lbs/acre	Rank	\$/acre	
6.0	39.0	60.0	34.8	8.4	0.82	1	\$599	3581	22540	5	\$270	
7.1	37.0	52.5	38.3	8.2	0.81	2	\$490	3505	22066	6	\$175	
5.9	38.9	53.0	35.4	8.0	0.79	3	\$274	3427	24928	3	\$747	
5.5	37.2	54.5	36.4	7.9	0.80	4	\$256	3347	24940	2	\$750	
5.8	41.7	52.8	28.0	8.6	0.77	5	\$246	3368	21260	7	\$14	
6.3	39.9	50.5	35.8	8.0	0.77	6	\$227	3505	22760	4	\$314	
6.0	38.7	51.5	35.7	8.5	0.79	7	\$226	3623	21191	8	\$0	
6.2	39.3	46.3	35.1	8.3	0.76	8	\$0	3422	24997	1	\$761	
	DM Yield T/A 6.0 7.1 5.9 5.5 5.8 6.3 6.3 6.0 6.2	Perfo DM Yield NDF T/A % 6.0 39.0 7.1 37.0 5.9 38.9 5.5 37.2 5.8 41.7 6.3 39.9 6.0 38.7 6.2 39.3	Performance r DM Yield NDF NDF T/A % % 6.0 39.0 60.0 7.1 37.0 52.5 5.9 38.9 53.0 5.5 37.2 54.5 6.3 39.9 50.5 6.3 39.9 50.5 6.0 38.7 51.5 6.2 39.3 46.3	Performance measure DM Yield NDF NDFD Starch T/A % % % 6.0 39.0 60.0 34.8 7.1 37.0 52.5 38.3 5.9 38.9 53.0 35.4 5.5 37.2 54.5 36.4 5.8 41.7 52.8 28.0 6.3 39.9 50.5 35.7 6.3 38.7 51.5 35.7 6.2 39.3 46.3 35.1	Performance measures DM Yield NDF NDFD Starch CP T/A % % % % 6.0 39.0 60.0 34.8 8.4 7.1 37.0 52.5 38.3 8.2 5.9 38.9 53.0 35.4 8.0 5.5 37.2 54.5 36.4 7.9 5.8 39.9 50.5 36.8 8.0 6.3 39.9 50.5 35.8 8.0 6.6 38.7 51.5 35.7 8.5 6.0 38.7 51.5 35.7 8.5 6.2 39.3 46.3 35.1 8.3	Performance measures DM Yield NDF Starch CP NEI T/A % % % % Mcal/lb G.0 39.0 60.0 34.8 8.44 0.82 7.1 37.0 52.5 38.3 8.24 0.81 5.9 38.9 53.0 35.4 8.00 0.79 5.5 37.2 54.5 36.4 7.9 0.80 5.5 37.2 54.5 36.4 0.79 0.80 5.5 37.2 54.5 36.4 0.79 0.80 5.6 37.2 52.5 38.8 0.77 0.83 0.77 6.3 39.9 50.5 35.7 8.50 0.79 6.0 38.7 51.5 35.7 8.50 0.79 6.2 39.3 46.3 35.1 8.3 0.76	Performance measures REV DM Yield NDF NDFD Starch CP NEI Relative T/A %	Performance weasures REV Results DM Yield NDF NDF Starch CP NE Relative difference T/A % % % % Mcal/ls Rank \$\$ T/A % % % % Mcal/ls Rank \$\$ 6.0 39.0 60.0 34.8 8.4 0.82 1 \$\$ \$\$ 7.1 37.0 52.5 38.3 8.2 0.81 2 \$\$ \$\$ 5.9 38.9 53.0 35.4 8.0 0.79 3 \$\$ \$\$ 5.5 37.2 55.4 36.4 7.9 0.80 \$\$ \$\$ 5.5 37.2 54.5 36.4 7.9 0.80 \$\$ \$\$ 5.5 37.2 54.5 36.8 0.77 \$\$ \$\$ \$\$ 6.3 39.9 50.5 35.8 8.0 0.77 \$\$ \$\$ <	Performance Sarch CP RE Rel/⊂ estite Mill/ton DM Yield NDF NDFD Starch CP NE Relative tifference Mill/ton T/A % % % Mcal/ls Rank \$	Performance measuresREV ResultsMIIk 2006DM YieldNDFNDFDStarchCPNEIRelatureMilkonMilkonMilk/AcresT/A%%%%Mcal/bRank\$%acre1bs/ton1bs/ton1bs/ton6.039.060.034.88.40.821\$5993581225407.137.052.538.38.20.812\$4903605220665.938.953.035.48.00.793\$2743427249285.537.255.836.47.90.804\$2563363221606.339.950.535.88.60.775\$2463365227606.633.751.535.78.50.797\$2263623211916.239.346.335.18.30.768\$0342224927	Performance measuresREVA ResultsMilk 2006 AnalysisDM YieldNDFNDFDStarchCPNERelative differenceMilk/tonMilk/tonRelativeT/A%%%%Mcal/bRank\$%arcelbs/tonlbs/tonlbs/arceRank6.039.060.034.88.40.821\$59935812254057.137.052.538.38.20.812\$49035052206665.938.953.035.48.00.793\$27434272492835.537.254.536.47.90.804\$25633472494025.537.254.536.88.600.775\$22633472494026.339.950.535.88.600.776\$22735052276046.038.751.535.78.50.797\$22636232111186.239.346.335.18.30.768\$03422249971	

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Table 2. Economic assessment of a hybrid performance trial in Crawford County PA, in 2007. Assumptions: Milk= \$20/cwt, NEL=\$0.07/Mcal, CP=\$0.13/lb, NDF=\$0.048/lb, no milk response to NDFD.

Hybrid	Performance measures						REV	A Results	Milk 2006 Analysis				
	DM Yield	NDF	NDFD	Starch	CP	NEI	Relative difference		Milk/ton	Milk/Acre	Relative difference		
	T/A	%	%	%	%	Mcal/lb	Rank	\$/acre	lbs/ton	lbs/acre	Rank	\$/acre	
NK Brand 39-Q1	7.1	37.0	52.5	38.3	8.2	0.81	1	\$267	3505	22066	6	\$175	
Gries 8697	6.2	39.3	46.3	35.1	8.3	0.76	2	\$218	3422	24997	1	\$761	
Pioneer 38A89	6.3	39.9	50.5	35.8	8.0	0.77	3	\$176	3505	22760	4	\$314	
Hubner 3120	6.0	38.7	51.5	35.7	8.5	0.79	4	\$130	3623	21191	8	\$0	
Garst 8758	5.9	38.9	53.0	35.4	8.0	0.79	5	\$95	3427	24928	3	\$747	
King's MC500	5.8	41.7	52.8	28.0	8.6	0.77	6	\$90	3368	21260	7	\$14	
Dekalb DKC 48-46	5.5	37.2	54.5	36.4	7.9	0.80	7	\$23	3347	24940	2	\$750	
Mycogen F2F485	6.0	39.0	60.0	34.8	8.4	0.82	8	\$0	3581	22540	5	\$270	

Summary

Rankings between REVA and Milk 2006 are considerably different.

Hybrids with high NDFD may be undervalued with Milk 2006.

Rankings of REVA are sensitive to feed price relationships and potential milk response to NDFD.

The REVA method appears to have potential to adjust hybrid performance rankings based on key on-farm variables: commodity prices and potential response to NDFD.

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